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Pioneer racer monoplane



A 3-function electric-powered scale look-a-like of an early racing monoplane for Speed 400/480 motors

I must first point out that this is not a scale model. It was only ever intended to very loosely resemble the Nieuport racer of 1910, and I do mean very loosely. I wanted an easy to build model that actually looks like a scale model and would remain pleasant to fly, and I feel pretty successful. The model construction has been kept very simple and is an absolute doddle to build, but I have added enough 'scale' detail to make it realistic. As built the model is only really suitable for fairly calm weather flying, but she is very easy to fly - very enjoyable too being slow, stable and very nostalgia inducing.

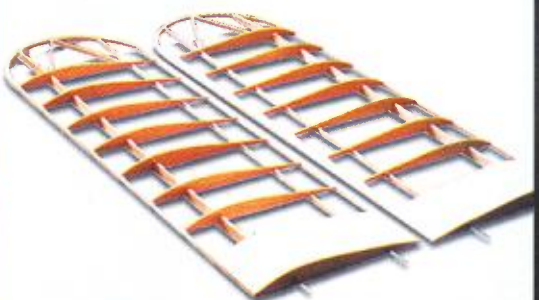


Author takes a break after a flight with the Pioneer.

However, for those who prefer more power, I have included on the plan the arrangement for installing the Speedgear 480 motor/gearbox unit as well as the 2.33:1 geared 400 as fitted to my model. You now have a choice - lightweight and fairly floaty, or a bit heavier and more powerful. The model is adequately strong for either version, in fact it was originally intended to have the more powerful set up, but this was already in another model. I'm happy enough with the result to be glad that I did go for the 400 option. It makes the model more suitable for flying from my local sports field.

Equipment

My model is quite light at about 27 oz. all up weight. All of the gear used in my model is not only very small and light, but also very reasonably priced. I used a Jeti 4 micro Rx. at about 1/2 oz. (£35), two of the small Union Models servos at just over 1/2 oz. for the pair (£17 each) and a Kontronic Easy 1000 speed controller, again at about 1/2 oz. (£25). All of these items have proved themselves to be very reliable in several other models.



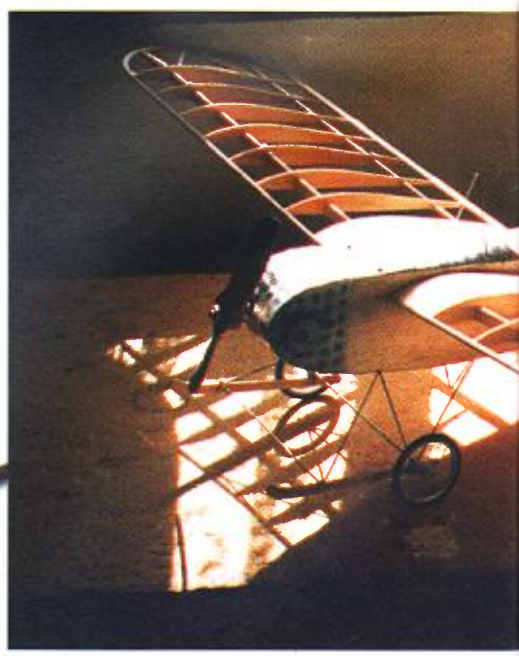
Wing construction is basic and requires no special skills.

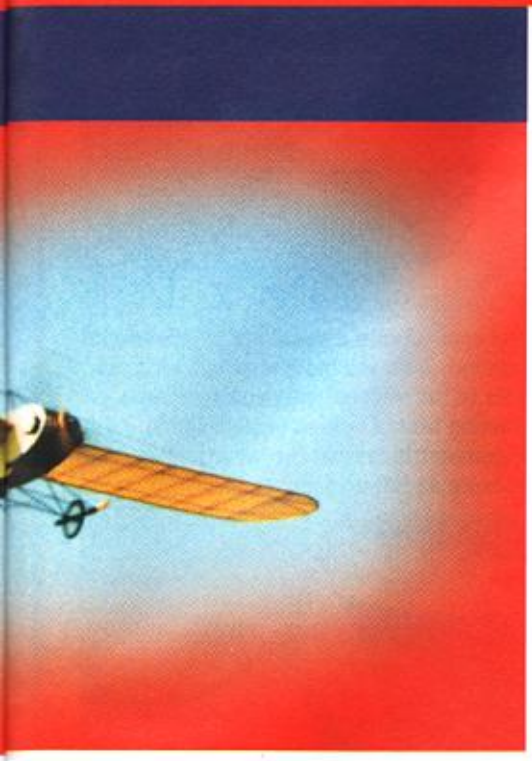
Power Train

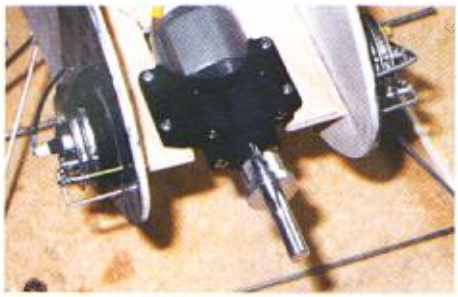
The one item that I won't cut corners on is the Ni-Cad pack. For the 400 powered version use 7 x 500 AR cells or 7 x 800 AR cells in the 480 combination. I know there are cheaper cells about and I have used them in the past, but I have yet to find a cell that charges as well, delivers its power so effectively or lasts as well as the AR cells from Sanyo.

For these lightweight models I find the Graupner 2.33:1 geared Speed 400 motor/gearbox a difficult combination to beat. It's very easy to mount using a ply plate and will turn a good sized

Assembled Pioneer before covering with Solarfilm and Litho-plate and fitting the rigging.



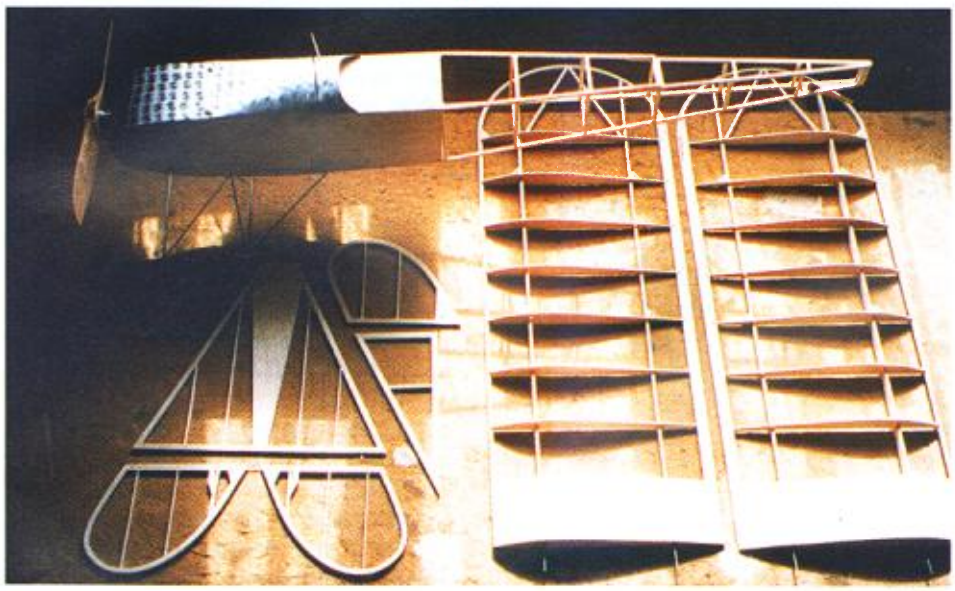




Motor installation reveals a prop extension and neat mounting plate. Note the dummy cylinders.

prop for long enough to make the flights enjoyable.

I like to use wooden props for their lightness and find the 'Master Airscrew Electric' range to be exceptionally good. Try a prop of around 10" x 7" to 11" x 8" initially, and then experiment with various makes and sizes until you find the one that suits your model and flying style.



Layout of all the constructed parts before assembly.



Linkages

Experience proves that the lightest and best control linkage is a closed-loop system which are also very scale like on models like the Pioneer. A 25lb breaking strain nylon mono-filament fishing line is ideal. It's light, cheap and more than strong enough for the job. Its real advantage over nylon-coated trace wire is weight-saving. Models of early aircraft usually have long tail and short nose moments, so the more weight we can save at the 'rear', the less need there is for lumps of 'church roof' in the nose.

I run my closed-loops from 1/32" ply control horns direct to the servo output arms, saving the weight of clevises and adjusters. It does take a bit longer to get it set up correctly and the weight saving is only small, but it's still worthwhile as every little bit helps. The cables are looped through crimps and cyanoed, and may then be painted with enamels.

Construction...

has been kept simple, so provided you have built a couple of similarly fabricated models, or are prepared to study the plan carefully to work it all out, you should have no trouble.

I'm a lazy builder; I enjoy the design stage as much as the building, therefore I tend to put quite a lot of thought into keeping it all quick and easy. With this in mind, a set of highly detailed stick A to B type instructions shouldn't be needed. If it looks as if that's how it's done on the plan, then there's a more than fair chance that it is how it's done.

However, if this is your first plan built model, I will cover the general construction method and give a few tips about how I did it.

Wings

You'll find that they don't take long to build once you have all the parts in front of you.

The tips are laminated from three strips of 3/16" x 1/16" balsa. Soak them well in water before adding PVA, and while damp tape together around a card template by securing the strips to one end of the template, and pull around under tension. Tape at intervals to the template. Make them about 1" overlength at each end to allow for trimming to size when thoroughly dry. Don't even attempt to use them before they are completely dry or de-lamination may occur.

Before you start building, mark and cut the slots in the inboard end of the spars to take the wing tubes. Measure the height of the tubes in the spar from the side-view showing this. Then build the wing panels, making sure that the 1/16" liteply ribs are in the correct positions. These add a lot of strength at the wing root and rigging points for very little extra weight.

Once the basic wing panels are built, you can fit the brass tubes for the wire wing dowels. Glue in place and then pack the spars above the tube up to flush with the top of the ribs and add the 1/32" ply braces. Do not omit these braces under any circumstances as they are all that prevent movement of the brass tubes.

Now add the root-rib bay sheeting and the hard balsa rigging blocks before trimming and sanding the wings.

Tail Surfaces

Laminate tips prior to building. The rudder is not shown because it's the same as an elevator, except for the control horn position.

The tail surfaces are built from strip and sheet balsa over the plan. Use fairly hard balsa for the tailplane outlines or this may well pull badly out of shape when you cover it.

The elevators are joined using an 18 swg joiner and the 1/32" ply horns are fitted after covering.

Fuselage

Build in two halves - the front sheeted section and the rear built up section are both built to basic box stage before being joined over the plan. This is a good way of avoiding a 'banana fuselage'. Make sure that you use hard balsa for the longerons.

When the halves are joined, bind and cyano the pylons to their respective formers, and the formers epoxy in place. Don't use cyano here as it dries too brittle and will come adrift.

Repeat with the rest of the wire parts, add the wing tubes, their liteply doublers and sheet the upper and lower surfaces of the fuselage before sanding smooth. Sanding is best done before the u/c is soldered and the skids fitted as it allows easier access.

Select the motor-plate to suit the power plant chosen, but note - fit whilst building the basic front fuselage box. If using the ply plate for the 400 motor be sure to install it for right side-thrust.

The front, wrap around section of the fuselage is made from Litho-plate which is retained with small self-tap screws into the hardwood blocks.

Access to the r/c gear for both installation and charging purposes is via a 1/32" ply hatch under the fuselage. Hinge this at the front with tape or film and secure it at the rear with a wire in tube catch.

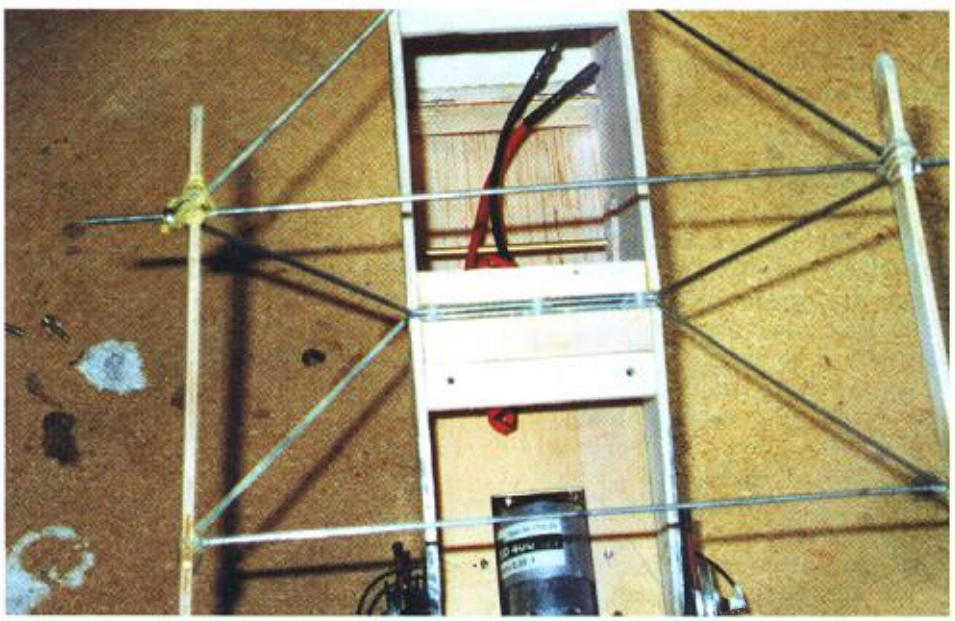
Undercarriage

Cut the u/c skids from 1/8" ply and have all smoothing and shaping done before fitting to the u/c legs and crossbrace.

Bind and solder together the main u/c legs, then tack glue the skids in place with cyano. Glue the 16swg crossbrace between the front skid legs. Neatly bind the skids to the wire parts using a really good strong thread and, when satisfied with the alignment, cyano all the bindings securely in place. The u/c parts should all be painted before proceeding further.

Having soldered the two inside wheel retaining washers to the axle, slip it into the V formed by the u/c legs. Using elastic shirring thread bind the axle to the skids, and then cyano the bindings on the underneath of the skid only. If you haven't bound things too tightly this will now allow the axle to stretch the bindings to form u/c springing.

The spoked wheels came from SAMS, and whilst really designed for free-flight models have proved fine on my lightweight r/c model. At £10 a pair they're not cheap, but do save an awful lot of work and most certainly look the part. If, however, your model works out much heavier you may well need to use stronger wheels, although the axle springing does absorb the strain caused by landing.



Underside view reveals many hidden secrets. The front access hatch is removed to reveal the battery lead, and method of securing the undercarriage to the fuselage.



The spoked wire-wheels are a commercial product. Note the method of securing the axle to the undercarriage using elastic shirring thread to give some flexible movement to relieve the u/c stress and operate as full-size practice.



Tail under surfaces show the rigging-wires and closed-loop elevator and rudder control wires.

Covering And Detailing

My prototype is covered with antique Solarfilm excluding the metal areas. This is much stronger than Litespan, but needs more care with shrinking if you are not to warp the tail surfaces. Use some rigging on the tail as this helps to prevent any twist creeping in through climatic temperature changes.

The matt finish was achieved by wiping the Solarfilm over with Prymol and giving the model a light spray with Spectrum matt varnish. Mask off the metal panelling before spraying.

The metal panels are made from Litho-plate cyanoed to the bare wood. This is actually only about the same weight as a sealed, primed and painted finish but looks much more realistic - it's also a whole lot quicker process.

All paintwork was Humbrol enamels.

The dummy cylinders can be commercial items or home made from bits and pieces. Mine were from an earlier model that had been retired due to "ill health".

Assembly

I epoxied the wing dowels into the wings of my model, you can't lose or forget one that way. When dry, slip the wings onto the fuselage and fit the rigging (25lb line again). This provides just enough stretch to allow attachment to the pylons, but still remains rigid enough to hold the wings firm in flight. Run the

rigging from a small fishing swivel at the top pylon through the rigging blocks in the wing, and finally to another swivel at the bottom pylon. When you are sure that your wings are accurately aligned, the rigging is cyanoed into place in the balsa rigging blocks. This system works exceedingly well and it makes the model very quick and easy to rig.

Use the wing/fuselage assembly as a guide for fitting the tail surfaces, using 5-minute epoxy to glue in place. My tail rigging uses the same fishing line as the rest of the rigging, with both ends passed through a crimp and locked-off with cyano. The crimp can then be hidden in the fuselage.

The control surfaces are hinged using Mylar strip and then the linkages are made up. A tip here is to make a small slotted patch for each cable and cyano this to the fuselage covering the cable entry. This will prevent the cables cutting into the covering, and when painted represent the leather or fabric patches used on full-size aircraft.

You should by now be looking at a finished model.

Flying

Make sure that your model balances just slightly nose down when supported under the C of G, check that the surfaces move in the correct directions, it's time for the ultimate test.

Pioneer will take off from a smooth surface, like a cricket field, but needs to be hand launched from anything rough. The 480 version should cope with all but the roughest of flying sites with its extra power.

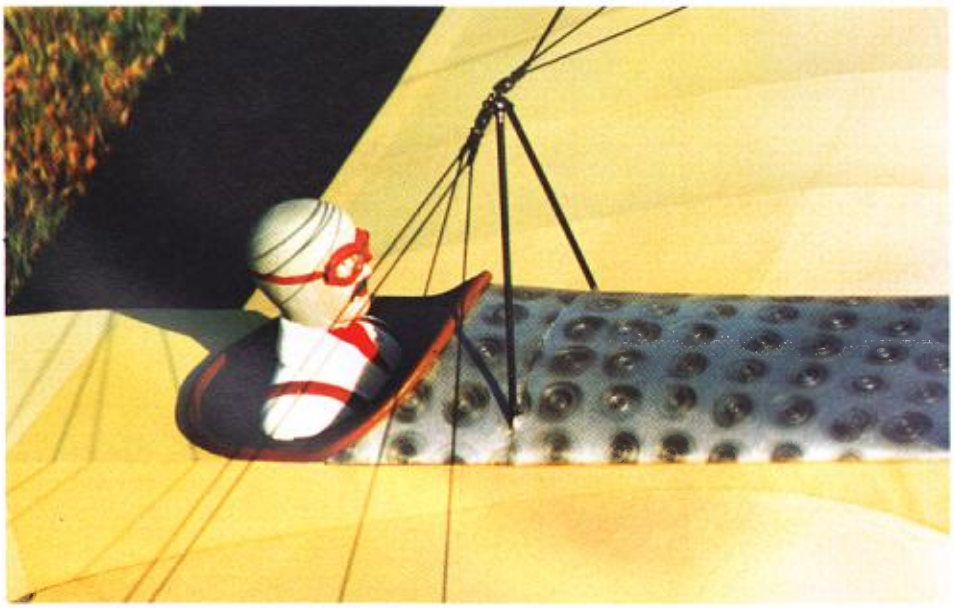
She tracks fairly straight provided you don't allow her to get too far out of wind.



Nose section reveals the Litho-plate covering for that little extra touch of realism. The undercarriage is finished with skids from 1/8" ply with wire braces.



The Pioneer is easy to fly and shows no nasty tendencies. It's easy to fly but should be landed with motor power will help prevent premature "arrivals".



Fishing "swivels" finish the rigging-wires and is easy to assemble for flight. Twists are also easy to undo with this method! Don't forget your pilot!!

Take-off is, as for all tail draggers, a case of holding her tail down until she is moving, correct any turn with rudder and once she has some speed ease her off with some up elevator. When airborne the climb out is steady and unhurried.

Turns with this model should be taken gently and not rushed. So no pylon turns please.

My Pioneer is easy to fly and shows no nasty tendencies. Even the stall is far more of a sag as the model simply refuses to climb any faster. 'Dead stick' landings are no problem so long as you don't try to hold her off for too long. She doesn't have a great deal of penetration on the glide, so it's far better to time the flight so that you can bring her in under power. Shut down the power completely just before she touches down and hold her tail down until she stops.

I hope you'll have a go at a Pioneer, it's cheap to build and will give hours of pleasure.

RCMW

Peter Rake